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### Recommended Citation

Hughes-Morgan, Margaret; Kolev, Kalin; and McNamara, Gerry, "A Meta-Analytic Review of Competitive Aggressiveness Research" (2018). *Management Faculty Research and Publications*. 367.

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# A Meta-Analytic Review of Competitive Aggressiveness Research

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## Abstract

Competitive aggressiveness has been at the center of competitive dynamics literature for decades, however there is no consensus as to its primary drivers and performance consequences. Thus, we present the results of a meta-analysis of the antecedents to and consequences of competitive aggressiveness using three aggressiveness components—competitive volume, complexity, and heterogeneity. Leveraging the awareness, motivation, capability framework as a guide of the drivers of competitive aggressiveness, we find that greater organizational size and age, lower slack resources and prior performance, greater market growth, lower market concentration, and more heterogeneous top

management teams lead to more aggressive actions. In addition, we found that among the different components of aggressiveness competitive volume improved operating performance.

## 1. Introduction

A large body of theoretical and empirical work demonstrates the widespread interest in how organizational and market characteristics affect competitive actions and interactions, and how these actions, in turn, influence firm performance. Prevailing theory and conventional wisdom suggest that companies should compete aggressively by undertaking a large number and variety of strategic moves (D'Aveni, 1994, Porter, 1985). However, the extant literature has not produced consistent conclusions about either the antecedents driving action or the performance outcomes associated with the patterns of actions undertaken by firms. For example, Chen and Hambrick (1995) found that smaller firms are more likely to be aggressive by initiating more competitive actions, and do so more quickly. Yet, Young, Smith, and Grimm (1996) found that large firms are more likely to carry out more total competitive moves in a given time period, and Miller and Chen (1994) found no relationship between firm size and competitive activity (notably from the same industry as Chen & Hambrick). Similarly, Miller and Chen (1994) found a negative relationship between past performance and the breadth of actions, while Gnyawali, He, and Madhavan (2006) found no relationship. For the impact of top management team (TMT) heterogeneity, Hambrick, Cho, and Chen (1996) and Hughes-Morgan, Ferrier, and Labianca (2010) found a positive relationship between TMT heterogeneity and volume of competitive activity, yet Ferrier (2001) found no relationship.

Looking at the performance consequences of competitive actions, we find a similar picture of conflicting results. Young et al. (1996) found in a study of software producers that aggressive firms, those that engaged rivals with a greater number of actions, obtained the highest performance. Yet, Derfus, Maggitti, Grimm, and Smith (2008) found that due to retaliation by competitors, or the “Red Queen” effect, this aggressive competitive activity ultimately had a negative impact on the same measures of performance.

In a review of this literature, Ketchen, Snow, and Hoover (2004) contended that “despite recent advances, much remains unclear about how and why firms pursue certain strategic moves” (p. 780) and that more integrative research in the competitive dynamics area is necessary to better understand how managerial, market, and firm characteristics lead to actions, and how actions impact performance.

Competitive aggressiveness, defined as the propensity to engage in a sustained, diverse, or unique series of actions to challenge rivals and enhance their relative competitive position, is a Gestalt-like sub-construct of competitive dynamics that is comprised of several sub-dimensions. While these sub-dimensions cannot measure unobserved variables such as propensity for risk taking, they are proxies for firm behaviors resultant from this orientation. For scholars and managers alike to understand the contributions of competitive dynamics to the field of strategy, we believe consensus conclusions drawn from the stream of competitive aggressiveness studies to date should be established. In addition to Ketchen et al. (2004), other studies have provided valuable narrative reviews of the literature to date that have significantly enhanced our understanding of theoretical contributions, and advanced our understanding of competitive interaction (Chen and Miller, 2012, Chen and Miller, 2015). However, as we will discuss further below, varying industry contexts, sample designs, and measurement of key aggressiveness dimensions have led to the aforementioned conflicting results. Given the importance of

aggressiveness to the overarching competitive dynamics construct, we believe a quantitative aggregation of previous studies will add value to Chen and Miller's prior inquiries.

To this end, we present the results of a meta-analytic review of the antecedents and outcomes explored in the competitive aggressiveness component of the competitive dynamics arena. Meta-analytic techniques allow us to develop an integrative framework on the main antecedents of competitive aggressiveness and its consequences, statistically aggregate and summarize existing empirical findings, and reconcile conflicting results in prior research. As a result, we can discuss with greater confidence the true relationships between aggressiveness variables and make broader generalizations to the validity of what drives firms to act, and the consequences of such action. As such, we address Ketchen et al.'s (2004) call to clarify what drives firm behavior by providing a clearer snapshot of aggregated results that assist in answering the question "what do we really know?"

We believe our study provides several substantive contributions to the competitive dynamics literature. First, we provide an integrative framework with which to examine the drivers of competitive aggressiveness and its performance consequences. Second, a meta-analysis allows us to obtain more robust effects by accounting for various study artifacts, such as sampling and measurement error (Hunter & Schmidt, 2004), to resolve inconsistent findings in prior research, and to bring more clarity to the field by providing insight on the relative strength of the proposed drivers of competitive action and the relationship between different patterns of competitive action and performance. Finally, we discuss measurement issues in the field and identify areas of potential for future research that will offer a more nuanced understanding of both the drivers of competitive action and the consequences of these actions on performance.

## 2. Background

Central to competitive dynamics is the conceptualization and measurement of the aggressiveness with which a firm carries out a series of competitive actions. Drawing from Austrian economics, hypercompetition theory, and corporate entrepreneurship (Covin and Slevin, 1991, D'Aveni, 1994, Jacobson, 1992, Kirzner, 1973, Lumpkin and Dess, 1996), competitive dynamics scholars generally define competitive aggressiveness as the propensity for firms to directly challenge rivals by completing a sustained, diverse, and unique series of competitive actions (\*Andrevski and Ferrier, 2017, \*Ferrier, 2001, \*Ferrier and Lee, 2002, \*Ferrier et al., 1999, Uhlenbruck et al., 2017). The competitive dynamics literature seizes on this argument and examines both the factors that lead to competitive aggressiveness and the effect of these aggressive actions on firm performance. Chen, Su, and Tsai (2007) synthesized the conceptual work in the competitive aggressiveness literature and developed a three-dimensional model of the drivers of this competitive tension. According to their awareness-motivation-capability (AMC) framework, firms are more likely to undertake competitive actions when managers are aware of the need for and potential gains of competitive action, are motivated to do so, and have the capabilities to undertake competitive activity. We draw on this framework to provide an integrative examination of competitive aggressiveness, to explain the drivers of competitive aggressiveness, and to assess the outcomes of this aggressiveness. We believe the AMC framework is the appropriate lens for this inquiry since it takes into account a complex and nuanced set of predictors of competitive activity. Rather than looking exclusively at the motivation to act, the most obvious driver of action, the AMC framework also considers the capabilities or opportunity to change as well as the awareness of other organizational or

situational factors that may dictate taking action, which are critical drivers in the competitive aggressiveness literature (Miller & Chen, 1994).

## 2.1. Background of the competitive aggressiveness construct

One of the most fundamental ideas of competitive interactions posits that firms should execute strategy in an effort to dampen the ability or motivation of competitors to respond (\*Ferrier, 2001, Nair and Selover, 2012, Smith et al., 2001). Porter, 1980, Porter, 1985 has advocated the merits of atypical competitive repertoires that confuse rivals and are difficult for competitors to detect and counter (Chen and MacMillan, 1992, Chen and Miller, 1994, \*Norman et al., 2007). In addition, effective competition from the Austrian perspective espouses strategic and resource heterogeneity (Jacobson, 1992). This perspective advocates creation of competitive advantage through possession of the awareness of opportunities, knowledge, resources, and flexibility to engage in a variety of actions. Successful firms are capable of combining and directing these resources to create more, and a greater variety of strategic actions than other firms. Thus, much of the basis for value creation is attributed to the ability of firms to innovate or compete in an aggressive manner to outmaneuver their competitors.

Arising from this notion of value creation through competition, the competitive dynamics stream of research has developed theory and empirical methods centering on conceptualization of firm strategy as *competitive action*. In general, early research in this stream focused attention on the *action-reaction dyad* level of analysis (Bettis and Weeks, 1987, Chen and MacMillan, 1992, MacMillan et al., 1985), whereby the characteristics of an individual competitive action, as well as the characteristics of the competing firms, are important predictors of the likelihood, speed, and type of both individual actions and competitive response (Smith, Grimm, Gannon, & Chen, 1991). Competitive dynamics research has more recently introduced the intertwined concepts of *competitive aggressiveness* and *competitive repertoires* which describe the intensity, pattern, and novelty of a sequence of competitive action events carried out in real time (\*Andrevski and Ferrier, 2017, \*Andrevski et al., 2014, \*Ferrier, 2001, \*Ferrier et al., 1999, Miller and Chen, 1994, \*Miller and Chen, 1996a, \*Miller and Chen, 1996b, Uhlenbruck et al., 2017). This line of research has advocated aggressive competitive behavior, more actions, innovative actions and unique actions. As such, competitive aggressiveness, a sub-construct of the larger mega-construct of competitive dynamics, relates to the antecedents and consequences of the patterns of competitive actions undertaken by firms. This view is consistent with the concept of strategy as “patterns of moves as an essential component of strategic competition” (Bettis & Weeks, 1987: 449), which are influenced by *management characteristics* (e.g. top management team heterogeneity), *organizational characteristics* (e.g. size and prior performance), and *market characteristics* (e.g. concentration and growth), and these have a demonstrable impact on competing firms' performance measures.

Scholars studying competitive aggressiveness have found, for example, that due to a variety of organizational and situational factors, such as slack resources or low industry concentration, some organizations compete aggressively with a wide range of competitive actions such as price cuts, product improvements, advertising campaigns, and the introduction of new products (\*Ferrier, 2001, \*Young et al., 1996). These types of moves are relatively more complex as opposed to a series of actions similar in nature. Relatedly, Andrevski and Ferrier (forthcoming) find that competitive aggressiveness as measured by the volume of actions undertaken has a greater impact on profitability when the firm had a dense alliance network. Miller and Chen (1996b) found that competitive heterogeneity was positively

associated with both market growth and the diversity of competitors in the marketplace. Thus, we can ascertain that the volume, breadth, and novelty of actions carried out by firms will be, in part, reliant on the characteristics of both the firm and the market in which it competes, but as discussed above no consensus has been revealed. Consistent with prior research and our definition of competitive aggressiveness articulated above, we conducted analysis on three widely used orthogonal, yet interdependent lower-order dimensions of this construct: *competitive volume* (the total number of moves), *competitive complexity* (the range of different moves), and *competitive heterogeneity* (distinctiveness from competitors' moves) (\*Andrevski et al., 2014, \*Andrevski and Ferrier, 2017, \*Chen et al., 2007, Chen and Miller, 1994, \*Ferrier, 2001, \*Ferrier et al., 1999, \*Hughes-Morgan et al., 2010, \*Hughes-Morgan and Ferrier, 2014, \*Miller and Chen, 1996a, \*Miller and Chen, 1996b, Smith et al., 2001, \*Young et al., 1996). The rest of the study is organized as follows. First, based on a comprehensive review of the existing literature we identify firm- and market-level variables and theorize on their role as antecedents of competitive aggressiveness; in addition, we examine the resultant performance implications of competitive aggressiveness. Then, we discuss our findings and conclude with implications for future research.

### 3. Hypotheses

#### 3.1. Management characteristics and competitive aggressiveness

##### 3.1.1. TMT heterogeneity as aggressiveness-enabling

Upper echelons theory holds that top managers, based on their own set of cognitions and experiences, make choices and decisions that shape a firm's competitive posture. Generally, heterogeneous TMTs possess a broad variety of cognitions and experiences that the team brings to bear in developing strategy and as such have more potential "socio-cognitive horsepower" (Carpenter, 2002: 277) than teams with homogeneous backgrounds and experiences. They will have more sources of information and a variety of perspectives from which to view the competitive landscape (Chen, Lin, & Michel, 2010). Thus, TMT heterogeneity leads to "diversity, novelty, and comprehensiveness in the set of recommended solutions" (Wiersema & Bantel, 1992: 96). Studies indicate, for example, that cognitive and experiential diversity among TMT members is associated with technical innovation (West & Anderson, 1996), a higher likelihood of alliance formation (Eisenhardt & Schoonhoven, 1996), and greater corporate diversification (Wiersema & Bantel, 1992). Researchers have also noted the potential negative repercussions of heterogeneity. For example, Finkelstein and Hambrick (1996) showed that heterogeneous TMTs undertake longer decision-making processes. Knight et al. (1999) found that heterogeneous TMTs were unlikely to arrive at strategic consensus; hence, high heterogeneity within the TMT will inhibit quick implementation of maneuvers comprising a strategy.

Hambrick et al. (1996) suggested that the human and social biases, filters, and processes of the top management team substantially influence competitive behaviors. A diverse team has broader cognitive resources, encompassing a broader "field of vision" (Hambrick & Mason, 1984:195) and also more extensive external contacts than does a homogeneous team (Hoffman and Maier, 1961, Jackson, 1992). Also, the heterogeneous team has access to such wide-ranging stimuli and has broad cognitive scope that its ability to envision and launch actions on many fronts is greatly enhanced. We believe this variety of cognitive schema and orientations that heterogeneous teams encompass will allow them to have a broader potential for generating actions that will outweigh the slower decision-making processes

associated with this heterogeneity. As such, we believe that TMT heterogeneity will be positively associated with competitive aggressiveness.

**H1** Firms with more heterogeneous TMTs will exhibit higher levels of competitive aggressiveness.

## 3.2. Firm level factors and competitive aggressiveness

### 3.2.1. Poor prior performance as aggressiveness-inducing

The motivation a firm has to undertake competitive actions is likely tied to its prior performance level. However, the direction of the relationship is somewhat unclear. For example, research has found that strong recent performance history of the organization leads to greater organizational action and aggressiveness than those that had less success (\*Gnyawali et al., 2006, Mishina et al., 2010). This may be because very successful firms realize that in order to maintain their success, they must carry out aggressive, deterrent behaviors. Relatedly, scholars have found that poor performance leads to less aggressive actions (Iyer & Miller, 2008).

However, other scholars have argued that superior performance will be negatively related to competitive aggressiveness since it reduces the motivation to act. These scholars have found that success gives rise to complacency and a reliance on well-developed organizational routines, thus inhibiting new competitive action (Lant et al., 1992, Miller, 1990). Further, high past performance induces “inertia” or lack of strategic change (Miller & Chen, 1994), simple action repertoires (Miller & Chen, 1996a), and repertoires that conform to industry norms (Miller & Chen, 1996b).

While there are competing findings, we believe, from a motivational standpoint, that poor performance rather than success is more likely to trigger aggressive action since struggling firms strive to improve their performance by directly confronting their rivals to better their own standing in the competitive environment. Scholars demonstrating this premise have found for example that firms performing below their performance goals are willing to take on greater risk (Bromiley, 1991, Greve, 2003), enter early into research and development consortia (Bolton, 1993), are more willing to change their strategy (Greve, 1998), and will act to grow the size of the firm (Greve, 2008). Thus, we regard poor past performance as an aggressiveness-motivating firm characteristic that will compel companies to carry out more, and more diverse competitive actions as they strive to increase returns.

**H2** Firms with lower performance will exhibit higher levels of competitive aggressiveness.

### 3.2.2. Firm size as aggressiveness-enabling

Within competitive aggressiveness research, the impact of organizational size on aggressiveness has been inconsistent. Some researchers have hypothesized and found that firm size reduces a firm's capability to act since it leads to the institutionalization of firm behaviors and routines, making change difficult (Miller and Chen, 1994, Miller and Friesen, 1984, Starbuck, 1985). In contrast, size may increase a firm's competitive aggressiveness since it enhances a firm's awareness of opportunities and its capability to influence its competitive environment. Competitive dynamics researchers have indeed demonstrated that larger firms are more recognizable in an industry than smaller firms, and that they differ from their smaller rivals in their competitive behavior (Chen & Hambrick, 1995). Consistent with this view, some research has found that large firms are more likely to carry out more total competitive moves in a given time period (Young et al., 1996) and carry out actions that are strategic in nature

(action significance) and visible (\*Chen et al., 2007, \*Chen and Hambrick, 1995). We believe large firms may be more aware of competitive opportunities since they are generally better connected and these connections allow them to better scan the horizon for actions of others to determine what types of actions are successful, as well as if they risk retaliation by competitors. Additionally, these large firms may feel more capable of enacting competitive moves since they have enhanced market power and visibility.

**H3** Larger firms will exhibit higher levels of competitive aggressiveness.

### 3.2.3. Slack resources as aggressiveness-enabling

From one perspective, slack resources may reduce the motivation of firms to enact aggressive competitive actions. This view regards slack resources as a buffer stock that reduces the motivation of a firm to respond to challenges or environmental turbulence (Nohria and Gulati, 1996, Williamson, 1964). Supporting this argument, Hambrick et al. (1996) found high levels of slack to be negatively related to the likelihood of initiating a competitive attack.

While slack may dampen motivation, it may also increase awareness and capability. In line with this view, we argue that greater organizational resources will increase the competitive aggressiveness of firms. Slack may increase awareness since it stimulates broad search (Cyert & March, 1963) and provides excess resources that allow firms to experiment and become aware of new opportunities (Levinthal & March, 1981). Additionally, slack resources represent liquid assets that firms may deploy whenever needed, and give them the ability to initiate competitive interactions and respond to the competitive actions of rivals (Haleblian, McNamara, Kolev, & Dykes, 2012). Thus, these resources impact firms' awareness and capabilities for action, and response to environmental opportunities. Firms with more resources have been shown to undertake more actions (Smith et al., 1991), carry out more competitive moves (Young et al., 1996), initiate strategic change (Bourgeois, 1981), and implement a wider variety of strategic moves following a rival's acquisition (Uhlenbruck et al., 2017). Moreover, high levels of slack resources have been shown to increase a firm's ability to initiate and maintain an aggressive pattern of competitive actions (Ferrier, 2001) and to respond faster and more effectively to environmental crisis than organizations with limited resources (Meyer, 1982).

**H4** Firms with more slack resources will exhibit higher levels of competitive aggressiveness.

### 3.2.4. Firm age as aggressiveness-enabling

As with the earlier firm characteristics, there are competing views on the effect of firm age on competitive aggressiveness. Some have argued and found that firm age impedes aggressiveness since it lessens the capability to act. The bureaucratic rules and routines or inertia which are more likely to exist in older firms can deter organizational action (Lant et al., 1992, Thompson, 1961). We, however, contend that based on the AMC framework, age increases the capability of a firm to implement a larger number and variety of strategic actions. Older firms have more experience and are thus aware of a greater range of strategic options. This experience base also enhances their perceived and actual capabilities to implement strategic moves. Thus, managers in older firms will be more confident in carrying out an increased number and a more diverse series of competitive actions, which in turn leads to higher levels of competitive aggressiveness. Newer firms, on the other hand, suffer from the "liability of newness" stemming from resource constraints associated with youth (Miller & Chen, 1996b). Also, younger firms are not yet as familiar with the industry and its history of interaction. Thus, they may not



be aware of as many possible competitive actions, and may also be reluctant to carry out very aggressive strategies for fear of retaliation.

**H5** Older firms will exhibit higher levels of competitive aggressiveness.

### 3.3. Market factors and competitive aggressiveness

#### 3.3.1. Market concentration as aggressiveness-inhibiting

While the findings regarding market concentration have not been equivocal, we thought it prudent to include it in our meta-analytic review to confirm whether it is one of the stronger predictors of competitive aggressiveness. Industry characteristics play an important role on a firm's competitive posture by either enhancing or dampening the motivation to compete aggressively (\*Ferrier, 2001, \*Ferrier et al., 2002). In highly concentrated industries, the oligopolistic structure of the market reduces a firm's motivation to compete aggressively (Young et al., 1996). The increased profit potential in such markets decreases the motivation to act since firms will not want to initiate intense competitive interactions that will drive prices down and negate the benefits of high concentration. Also, in highly concentrated markets competitors are more aware of the actions of their rivals, thus an aggressive action will possibly trigger retaliation since competitors are able to monitor the actions of the limited rivals in the market, as well as have resources to mount a response. As a result, firms in highly concentrated markets will tend to forego initiating aggressive competitive actions to avoid the anticipated retaliation from rivals (Haveman & Nonnemaker, 2000). Thus, the motivation to undertake a large and diverse set of competitive actions decreases.

**H6** Firms in industries with higher levels of market concentration will exhibit lower levels of competitive aggressiveness.

#### 3.3.2. Market growth as aggressiveness-inhibiting

Market growth also plays a role in the motivation to undertake strategic initiatives (Miller & Chen, 1994) yet findings pertaining to this market characteristic are equivocal. Miller (1990) contends and research has found that under conditions of high growth, rivalry is generally less intense than under conditions of low demand. Rather than compete to take existing customers away from rivals, firms can attract new customers coming into the market which decreases the motivation for rivalrous competition. Similarly, other scholars have found that slow growth motivates strategic aggressiveness resulting in more intense competition and lower profitability (\*Derfus et al., 2008, Smith et al., 1992). However, recently, Andrevski et al. (2014) argued and found that “firms in high-growth industries have greater potential to discover market segments, offer new products, increase geographical and product market scope, and enhance or expand their competitive positions” (p. 826) which would lead to increased competitive aggressiveness. We believe faster market growth is likely to garner less competitive aggressiveness. The motivation to act aggressively is lower in faster growing markets since there are customers entering these markets at a higher rate, thus aggressiveness is not as warranted (McNamara, Halebian, & Dykes, 2008).

**H7** Firms in high-growth industries will exhibit lower levels of competitive aggressiveness.

### 3.4. Consequences

An important principle of competitive rivalry posits that when firms are able to initiate and sustain competitive attacks toward rivals these actions will keep rivals off balance (D'Aveni, 1994, \*Ferrier,

2001). However, the competitive aggressiveness literature seems to be at odds over the ultimate impact on operating, or internal performance measures (such as return on assets and return on equity). More aggressive strategies come with associated costs and inherent risks, as well as higher risk of competitor retaliation or the “Red Queen effect” (Derfus et al., 2008). This may outweigh the benefit of carrying out a very aggressive series of competitive actions (Porter, 1980, Porter, 1985, Shamsie, 1990) and costs may rise faster than revenues, leading to a negative impact on performance. Conversely, other prior research that tested the relationship between competitive action characteristics and operating performance found that the total number (or volume) of competitive actions is related to better firm performance (\*Ferrier, 2001, \*Ferrier et al., 1999, Huff and Robinson, 1994, \*Young et al., 1996). Similarly, Miller and Chen (1996a) found that simplicity (lack of complexity) of competitive repertoires would affect performance negatively. Although competitive moves are associated with costs and inherent risks, they are the building blocks toward increasing competitive advantage and operating profit generation. Therefore, we contend that higher levels of competitive aggressiveness will be positively related to post operating performance.

**H8** High levels of competitive aggressiveness will lead to higher post operating performance.

We chose to separate post operating performance and stock performance as competitive dynamics scholars have suggested that stock performance is the result of investor's *perceptions* of the patterns of competitive actions, and this may include drivers that are unrelated to operating performance (e.g., \*Andrevski et al., 2014, Bettis and Weeks, 1987, \*Hughes-Morgan et al., 2017). We contend that the market would view greater aggressiveness positively. Investors are likely to associate firm's competitive aggressiveness with anticipated rent generation and thus bid up its stock. For example, finance scholars have found that a firm's overall visibility with investors, as measured by its product market advertising, has positive consequences for equity shares (Grullon, Kanatas, & Weston, 2004). We believe that when a firm carries out very aggressive strategies that include a large number and variety of moves it will be rewarded by the market through appreciation of its equity shares.

**H9** Higher levels of competitive aggressiveness will lead to higher stock market performance.

## 4. Methods and results

### 4.1. Sample

We identified the studies for inclusion in the meta-analysis in four steps to ensure completeness. First, we searched the ABI/INFORM and Science Direct databases studies with the following search, using the keywords “competitive dynamics”, “competitive aggressiveness”, “competitive action(s)”, “competitive repertoire(s)”, “competitive behavior(s)”, “competitive move(s)”, “competitive sequence(s)”, “competitive attack(s)”, “competitive deviance”, and “competitive non-conformity”. Second, we conducted an issue-by-issue search of sixteen leading journals in the management and marketing fields (*Academy of Management Journal, Administrative Science Quarterly, Journal of International Business Studies, Journal of Management, Journal of Management Studies, Journal of Managerial Issues, Journal of Marketing, Journal of Business Research, Journal of Marketing Research, Management Science, Managerial and Decision Economics, Marketing Science, Organization Science, Organization Studies, Strategic Management Journal, and Strategic Organization*). Third, we manually retrieved the reference sections of prior narrative reviews and key studies in the competitive dynamics research (e.g. Ketchen et al., 2004, Smith et al., 2001). Using this process, we identified 108 potential applicable

studies. We used three criteria to qualify the study for inclusion: (1) the study contained at least one correlation under investigation; (2) the study contains sufficient information to calculate correlations; (3) the study is empirically examined using primary or secondary data sources.

Our choice of independent variables was motivated by 1) those that have been linked to competitive aggressiveness, and 2) those that had enough testable correlations (at least three) to be included in our meta-analytic procedures. Of the 108 identified studies within the realm of competitive dynamics, only 33 had reported correlations that addressed our construct of interest, competitive aggressiveness, and were not from the same database. Structural content analysis of news reports and announcements is widely employed for data collection in the competitive dynamics literature. As this procedure is very time consuming and provides a wealth of information, scholars often use the same dataset for multiple studies. Of the 108 studies in our initial sample, 11 were from a single database. To avoid repetitive counts of the same correlations from the same database, we only entered into the meta-analysis the effect size of the largest sample size. This resulted in the inclusion of 33 studies (207 correlations for testing the proposed hypotheses and a combined N size of 345,006).

## 4.2. Coding

At the beginning of the coding process, the first author and an additional coder met several times to outline coding rules and coded jointly several articles. Any inconsistencies in the coding of these articles were resolved via discussions to ensure consistent coding of all articles. After that, the remaining articles were split between the two coders for independent coding.

## 4.3. Meta-analytic procedures

We conducted the meta-analysis following Hunter and Schmidt, 1990, Hunter and Schmidt, 2004 psychometric analytic procedure. It relies on random-effects model which is the preferred approach since it assumes that population effect sizes vary across samples and provides appropriate type I error rate (Geyskens et al., 2009, Kepes et al., 2012). To correct for interdependent effect sizes, we followed two procedures. First, as noted by prior meta-analyses in strategic management (Dalton et al., 2003, King et al., 2004, Pina et al., 2013), studies might report multiple effect sizes relevant to the wealth effect of competitive aggressiveness. For the studies incorporating multiple operationalizations of operating or market performance, using the composites formula provided by Hunter and Schmidt (2004), we combined the multiple effect sizes into a single correlation before entering it in the meta-analysis. To obtain the true score correlations across all of the studies involved in the analysis, we corrected for systematic artifacts including sampling error, measurement error, and range restriction. To correct for the sampling error, we calculated the average effect size that is weighted by the sample size of the study in order to calculate the mean weighted correlations. Consistent with prior meta-analyses in strategic management (Dalton et al., 1998, King et al., 2004), we chose a more conservative 0.80 reliability estimate for the observed variables. We set range restriction at 1 (Kolev, 2016, Lee and Madhavan, 2010). The true score correlations of tested relationships are shown in Table 1.

Table 1. Meta-analytic results of the antecedents and outcomes of competitive aggressiveness<sup>a</sup>.

Variable	N	k	r	$\rho$	SD	95% CI		90% CV	
Antecedents of competitive volume									
<b>TMT heterogeneity</b>	<b>2313</b>	<b>4</b>	<b>0.08</b>	<b>0.10</b>	<b>0.08</b>	<b>0.02</b>	<b>0.18</b>	<b>0.00</b>	<b>0.2</b>
<b>Prior performance</b>	12,610	10	- 0.03	- 0.03	0.12	- 0.11	0.04	- 0.19	0.12
<b>Organizational size</b>	<b>20,962</b>	<b>13</b>	<b>0.27</b>	<b>0.34</b>	<b>0.25</b>	<b>0.20</b>	<b>0.48</b>	<b>0.02</b>	<b>0.67</b>
<b>Slack</b>	<b>18,600</b>	<b>7</b>	<b>- 0.05</b>	<b>- 0.06</b>	<b>0.08</b>	<b>- 0.12</b>	<b>- 0.002</b>	<b>- 0.16</b>	<b>0.04</b>
<b>Organizational age</b>	17,316	5	0.03	0.04	0.05	- 0.01	0.08	- 0.02	0.09
<b>Market concentration</b>	11,992	9	- 0.03	- 0.04	0.15	- 0.14	0.06	- 0.23	0.15
<b>Market growth</b>	<b>11,175</b>	<b>6</b>	<b>0.01</b>	<b>0.01</b>	<b>0.11</b>	<b>- 0.07</b>	<b>0.10</b>	<b>- 0.12</b>	<b>0.15</b>
Antecedents of competitive complexity									
<b>TMT heterogeneity</b>	6715	3	- 0.05	- 0.07	0.14	- 0.23	0.09	- 0.24	0.11
<b>Prior performance</b>	10,242	8	0.01	0.02	0.00	- 0.003	0.04	0.02	0.02
<b>Organizational size</b>	<b>18,682</b>	<b>11</b>	<b>0.28</b>	<b>0.35</b>	<b>0.17</b>	<b>0.25</b>	<b>0.45</b>	<b>0.14</b>	<b>0.56</b>
<b>Organizational age</b>	<b>21,639</b>	<b>5</b>	<b>0.08</b>	<b>0.10</b>	<b>0.06</b>	<b>0.05</b>	<b>0.16</b>	<b>0.02</b>	<b>0.18</b>
<b>Market concentration</b>	10,914	7	- 0.01	- 0.01	0.09	- 0.08	0.06	- 0.13	0.11
<b>Market growth</b>	<b>8597</b>	<b>4</b>	<b>0.07</b>	<b>0.09</b>	<b>0.00</b>	<b>0.07</b>	<b>0.11</b>	<b>0.09</b>	<b>0.09</b>
Antecedents of competitive heterogeneity									
<b>Prior performance</b>	<b>7876</b>	<b>3</b>	<b>- 0.05</b>	<b>- 0.06</b>	<b>0.00</b>	<b>- 0.08 -0.04</b>		<b>- 0.06 - 0.06</b>	
<b>Organizational size</b>	8373	5	0.02	0.03	0.10	-0.06	0.12	- 0.10	0.16
<b>Slack</b>	7871	3	0.01	0.02	0.02	- 0.02	0.05	- 0.02	0.05
<b>Organizational age</b>	7871	3	0.05	0.06	0.00	0.04	0.09	0.06	0.06
<b>Market concentration</b>	<b>6382</b>	<b>3</b>	<b>- 0.11</b>	<b>- 0.14</b>	<b>0.00</b>	<b>- 0.16</b>	<b>- 0.12</b>	<b>- 0.14</b>	<b>- 0.14</b>
Antecedents of competitive aggressiveness									
<b>Prior performance</b>	12,891	13	- 0.01	- 0.01	0.06	- 0.05	0.02	- 0.09	0.06
<b>Organizational size</b>	<b>23,062</b>	<b>19</b>	<b>0.28</b>	<b>0.34</b>	<b>0.20</b>	<b>0.25</b>	<b>0.44</b>	<b>0.09</b>	<b>0.60</b>
<b>Organizational age</b>	<b>23,683</b>	<b>9</b>	<b>0.06</b>	<b>0.07</b>	<b>0.04</b>	<b>0.04</b>	<b>0.10</b>	<b>0.02</b>	<b>0.12</b>
<b>Market concentration</b>	20,119	15	- 0.05	- 0.07	0.13	- 0.13	0.001	- 0.23	0.10
Wealth effects of competitive volume									
<b>Post operating performance</b>	<b>10,695</b>	<b>7</b>	<b>0.08</b>	<b>0.10</b>	<b>0.10</b>	<b>0.03</b>	<b>0.18</b>	<b>- 0.02</b>	<b>0.23</b>
<b>Post market performance</b>	10,291	3	- 0.01	- 0.02	0.04	- 0.07	0.03	- 0.07	0.04
Wealth effects of competitive complexity									
<b>Post operating performance</b>	9330	7	- 0.004	- 0.01	0.07	- 0.06	0.05	- 0.10	0.08

Wealth effects of competitive heterogeneity									
<b>Post operating performance</b>	988	6	- 0.04	- 0.05	0.14	- 0.18	0.08	- 0.23	- 0.13
Wealth effects of competitive aggressiveness									
<b>Overall performance</b>	23,817	19	0.03	0.04	0.10	- 0.01	0.09	- 0.09	0.17

<sup>a</sup>N = combined sample size; k = number of correlations; r = raw score correlation;  $\rho$  = corrected true score population correlation; SD = standard deviation of true score population correlation; CI = confidence interval; CV = credibility interval.

The main construct of interest in this meta-analysis is competitive aggressiveness. Prior research has identified and focused on three dimensions of competitive aggressiveness – strategic volume, complexity, and heterogeneity. Since many studies focused on only one or two of these dimensions of competitive aggressiveness, most of our hypotheses were tested only for those dimensions.

#### 4.4. Managerial and firm level antecedents of competitive aggressiveness

Hypothesis H1 predicted that the heterogeneity of the top management team is positively related to competitive aggressiveness. As shown in Table 1, this hypothesis is supported as measured for competitive volume ( $\rho = 0.10$ ,  $k = 4$ ,  $N = 2313$ ), but interestingly, findings for competitive complexity were not significant since the confidence interval included zero. In Hypothesis H2, we examined the relationship of prior performance with competitive volume, competitive complexity, and competitive heterogeneity. In line with the hypothesis, we found a negative relationship between prior operating performance and competitive heterogeneity with a true population correlation of  $-0.06$  ( $k = 3$ ,  $N = 7876$ ). We found no statistically significant relationship between prior performance and competitive volume or complexity or the overall aggressiveness index. We proposed a positive relationship between organization size and competitive aggressiveness in Hypothesis H3. We found support for this hypothesis where organization size is positively related to both competitive volume ( $\rho = 0.34$ ,  $k = 13$ ,  $N = 20,962$ ) and competitive complexity ( $\rho = 0.35$ ,  $k = 11$ ,  $N = 18,682$ ). However, for competitive heterogeneity the relationship was positive but not significant. Organizational size was positively and significantly related to the overall competitive aggressiveness index ( $\rho = 0.34$ ,  $k = 19$ ,  $N = 23,062$ ). Slack and competitive aggressiveness were proposed to be positively correlated (Hypothesis H4). However, we found that greater slack is associated with lower competitive volume ( $\rho = -0.06$ ,  $k = 7$ ,  $N = 18,600$ ). We proposed that organizational age and competitive aggressiveness would be positively correlated (Hypothesis H5). This hypothesis is supported for competitive complexity ( $\rho = 0.10$ ,  $k = 5$ ,  $N = 21,639$ ) and competitive heterogeneity ( $\rho = 0.06$ ,  $k = 3$ ,  $N = 7871$ ) but not for competitive volume. In addition, we found a positive relationship between organizational age and the overall competitive aggressiveness index ( $\rho = 0.07$ ,  $k = 9$ ,  $N = 23,683$ ).

#### 4.5. Market level antecedents of competitive aggressiveness

Hypothesis H6 proposed a negative relationship between market concentration and competitive aggressiveness. This was confirmed only for competitive heterogeneity ( $\rho = -0.14$ ,  $k = 3$ ,  $N = 6382$ ) but not for competitive volume, complexity, and the overall competitive aggressiveness index. Hypothesis H7 – firms in high growth industries exhibit lower levels of competitive aggressiveness – was not supported. We found that market growth is positively related to competitive complexity ( $\rho = 0.09$ ,  $k = 4$ ,  $N = 8597$ ) and not significantly related to competitive volume (Table 2).

Table 2. Differing operationalizations of competitive volume, complexity, and heterogeneity.

Study	Measure
Competitive volume	
<b>Andrevski et al. (2016); Andrevski and Ferrier (forthcoming); Andrevski et al. (2014); Basdeo et al. (2006); Chen et al. (2010); Connelly et al. (2016); Derfus et al. (2008); Ferrier and Lee (2002); Ferrier et al. (2002); Ferrier et al. (1999); Nadkarni, Chen, and Chen (2016); Young et al. (1996)</b>	All competitive actions in a calendar year
<b>Chen and Hambrick (1995); Hambrick et al. (1996) – propensity for action</b>	Total number of actions/airline routes
<b>Chen et al. (2007) – attack volume</b>	Firm's number of entries into a rival's market
<b>Connelly, Tihanyi, Certo, and Hitt (2010)</b>	Number of actions multiplied by their weighted significance
<b>Ferrier (2001) – competitive attack</b>	Average number of competitive actions composing a competitive attack
<b>Gnyawali et al. (2006)</b>	z-Score of number of actions to control for stimulant effect of rivals activity
<b>Hughes-Morgan et al. (2017)</b>	All competitive actions in a calendar month
<b>Miller and Chen (1994) – competitive inertia</b>	Activity index that is the standardized score of <i>j</i> types of actions
<b>Young, Smith, Grimm, and Simon (2000)</b>	Percentage of all moves undertaken by a focal firm
Competitive complexity	
<b>Andrevski et al. (2016); Andrevski et al. (2014); Gnyawali et al. (2006)</b>	Blau's heterogeneity index
<b>Andrevski and Ferrier (forthcoming); Basdeo et al. (2006); Ferrier (2001); Ferrier and Lyon (2004); Ferrier et al. (1999); Gnyawali et al. (2006); Hughes-Morgan et al. (2010); Hughes-Morgan and Ferrier (2014); Hughes-Morgan et al. (2017), Ndofor, Sirmon, and He (2011); Rindova et al. (2010); Roberts &amp; Amit (1995)</b>	Herfindahl index
<b>Miller and Chen (1996a); Larrañeta, Zahra, and Galán González (2014)</b>	Measure comprised of three different indexes: <i>range</i> (the number of different types of actions), <i>concentration</i> (numerical emphasis on the most commonly employed action types), and <i>dominance</i> (numerical emphasis on the single most common type of action employed by the firm)
<b>Connelly et al. (2016)</b>	Shannon index
Competitive heterogeneity	

<b>Basdeo et al. (2006); Ferrier et al. (1999); Hughes-Morgan et al. (2010)</b>	Difference between the proportion of actions of a given type for a focal firm and its rival
<b>Hughes-Morgan et al. (2017); Miller and Chen (1996b); Marcel, Barr, and Duhaime (2011); Ndofor et al. (2011); Roberts &amp; Amit (1995); Norman et al. (2007)</b>	Deviation from industry norm



## 4.6. Consequences

In Hypothesis H8, we argued for a positive relationship between competitive aggressiveness and post operating performance. Results show a significant true correlation of 0.10 ( $k = 7$ ,  $N = 10,695$ ) between competitive volume and post operating performance. Neither competitive complexity, heterogeneity, or the overall aggressiveness index had a significant impact on operating performance. Hypothesis H9 predicted a positive relationship between competitive aggressiveness and post market performance; however, the correlation between competitive volume and post market performance was not statistically significant.

## 5. Discussion

The primary goal and contribution of this study is to explore the antecedents and consequences of competitive aggressiveness and to resolve inconsistent findings in prior research. Utilizing the AMC framework, we developed hypotheses regarding how firm- and market-level characteristics impact competitive aggressiveness and its three components of competitive volume, complexity, and heterogeneity. We then assessed how these strategic patterns impacted organizational outcomes in terms of post operating and stock market performance.

In our analysis, we reasoned that the heterogeneity of the top management team would increase awareness and capability leading to higher levels of aggressiveness. We found a positive relationship for volume supporting Hambrick et al. (1996) and Andrevski et al. (2014) who found that heterogeneous TMTs are associated with a greater volume of actions. Our results, however, do not provide support for competitive complexity which has been argued to be an outcome of high TMT heterogeneity (Ferrier, 2001). A tentative explanation for this non-finding might be the fact that greater TMT heterogeneity hinders easy and quick agreement among firm executives on the complex future strategic actions to be undertaken. Thus, while heterogeneous teams are more aware of the necessity to carry out complex moves, they might not be able to reach consensus on which specific moves to pursue. Ultimately, our results point at an interesting paradox where heterogeneous TMTs might be viewed as a double-edge sword: they may be capable of taking on a large volume of actions, but they are hampered in their ability to agree to complex patterns of actions.

Looking at the role of past performance, we found that poor past performance increases competitive heterogeneity. This result is in line with performance feedback research (Bromiley, 1991, Greve, 2003) and some findings in the competitive dynamics literature (Hughes-Morgan et al., 2017) indicating that firms are more likely to rely on actions different from their competitors to address financial problems. We did not find empirical support for volume and complexity. Combining those results points to an interesting revelation – it appears that firms view actions distinctive from their competitors (rather than just more actions) as the most viable solution to respond to poor performance. In essence, firms look for a new strategic “recipe” to address this outcome.

Based on the awareness and capability elements of the AMC framework, we suggested the relationship between organization size and competitive aggressiveness is positive. We found general support for this hypothesis through positive and significant relationships between organizational size and both competitive volume and complexity. This result is in support of Miller and Chen (1994) and Connelly, Tihanyi, Ketchen, Matz Carnes, and Ferrier (2016) who found larger firms to be more aggressive and contrary to findings by Chen and Hambrick (1996). This suggests larger firms may be aware of

competitive opportunities due to enhanced monitoring capabilities, and possess a comprehensive set of assets, competences, and tools to support an increased number and a broader range of competitive actions.

Also rooted in the awareness and capability elements of the AMC framework, we reasoned that firms with more slack resources would exhibit higher levels of competitive aggressiveness yet found the opposite result for competitive volume. While slack clearly makes a firm more capable of carrying out more actions, slack can also be seen as a buffer from environmental turbulence, and as such, lead to complacency and resistance to taking bold actions or a high volume of actions (Cyert and March, 1963, Greve, 2003). Thus, while some studies suggest slack leads to higher levels of activity (Ferrier, 2001), our results are supportive of Andrevski and Ferrier (forthcoming).

In support of Miller and Chen (1994), we hypothesized and found a positive relationship between organizational age and competitive complexity and the overall competitive aggressiveness index. On one hand, Lant et al. (1992) argued that bureaucratic rules and routines would prevail in older firms which could stymie organizational action and competitive aggressiveness as firms become “set in their ways”. However, the awareness and capability elements of the AMC framework would suggest that since older firms have more experience in the marketplace as well as in implementing strategic moves, their aggressiveness could increase.

Using the awareness and motivation elements, we reasoned and found that market concentration is negatively related to aggressiveness (albeit the relationship was significant only for competitive heterogeneity). Higher concentration levels may foster collusive behaviors and lessen motivation for aggressive competitive behaviors. Furthermore, this stable market structure could breed organizational inertia, or the tendency to continue down the same path (Kelly and Amburgey, 1991, Levin et al., 1985, Miller and Chen, 1994). As a result, firms in these oligopolistic type markets may be less motivated to carry out a multitude of heterogeneous competitive actions.

Our hypothesis that firms in high-growth industries will exhibit lower levels of competitive aggressiveness was not supported and rather we found that high market growth leads to higher competitive aggressiveness. This is in line with Miller and Chen (1994) who found that market growth led to new resource commitments in the form of competitive actions, and contrary to Derfus et al. (2008) who found less intense competitive activity under conditions of high growth.

Looking at the results regarding the performance implications of competitive aggressiveness, we can see some interesting findings. In support of Ferrier et al. (1999) among others, we found a positive relationship between competitive volume and post operating performance. However, the relationships between competitive complexity/heterogeneity and performance were not significant. Collectively, these findings show that while engaging in greater volume of actions is beneficial, firms should be aware that pursuing a complex and distinctive set of actions might not generate the desired outcomes.

## 5.1. Measurement issues as potential causes of non-findings

Below is a table outlining the various conceptualizations and operationalizations of competitive volume, complexity and heterogeneity.

Variations in operationalizations could account for some lack of findings in our meta-analysis, particularly for competitive complexity which has shown conflicting results in prior literature. For

example, Roberts and Amit (1995), Ferrier et al. (1999), and Basdeo, Smith, Grimm, Rindova, and Derfus (2006), among others operationalize competitive complexity as a Herfindahl index that calculates the ratio of each of the action categories to total actions. Then, to account for the weighted distributions of actions, these authors square and sum each squared proportion to arrive at a complexity measure. \*Miller and Chen, 1996a, \*Miller and Chen, 1996b introduce the concept of competitive *simplicity*<sup>1</sup> and use three different indexes for it in their analysis. These include *range* (the number of different types of actions), *concentration* (numerical emphasis on the most commonly employed action types), and *dominance* (numerical emphasis on the single most common type of action employed by the firm). Connelly et al. (2016) introduce yet a third operationalization using the Shannon index which recognizes for example ten actions in ten categories is a more sophisticated repertoire than five actions in five categories, thus assigning it a higher score whereas the Herfindahl index does not. These variations could account for the conflicting findings between Miller and Chen (1996a) who found a negative relationship between simplicity (the opposite of complexity, thus complexity was positive) and performance, Connelly et al. (2016) who found complexity as a strong *negative* predictor of performance, and Ferrier (2001) who found no relationship. Similarly, Miller and Chen (1996a) demonstrated higher past performance had a positive impact on simplicity yet Connelly et al. (2016) found past performance to have a positive impact on complexity. Thus, while the conceptualizations of these concepts are similar, the variations in the measurements leave us with very little consensus for complexity. In order to flesh out the true relationship between complexity and important variables such as performance, scholars need to coalesce around a single measure for this often-studied variable for consistency in conceptualization and enlightenment of its impact. Due to its rigor, we believe that the Shannon index utilized by Connelly et al. (2016) is a germane option.

A further element of the disagreement among studies could be attributed to the varying contexts within which the research takes place. Several of the studies included in the body of competitive aggressiveness research are from the airline industry. However, the convergence stops there. For example, Ferrier et al.'s work covers 41 industries, Derfus et al. (2008) cover eleven different industries and Connelly et al. (2016) cover 204 industries. Many of the other studies included are single-industry studies: Gnyawali et al. (2006) cover the steel industry, Roberts and Amit (2003) examine the Australian banking industry, Young et al. (1996) look at computer software, Rindova, Ferrier, and Wiltbank (2010) focus on internet firms, and Hughes-Morgan et al. (2017) cover pharmaceuticals. The dynamics within these various industries could play a major role in the awareness, motivation, and capability of firms to compete aggressively. Thus, scholars may want to address the characteristics of their particular industry that impact competitive aggressiveness.

## 5.2. Limitations and future directions

As with any study, our meta-analysis has limitations. First, we were constrained to the availability of empirical results in prior studies and could not analyze multiple studies which were qualitative in nature or lacked sufficient quantitative statistics to estimate effect sizes. While other corporate and market characteristics have been studied in the realm of competitive dynamics, there were not enough demonstrated correlations to include them in our meta-analytic procedures. For example, identity domains, decision-making speed, and social network embeddedness (\*Andrevski et al., 2016, \*Ferrier and Lyon, 2004, Livengood and Reger, 2010), have demonstrated significant impact on competitive aggressiveness, however there were not enough studies to include them in the analysis. Also, while many industries are covered in the analysis, as we point out previously, several of the correlations

included are from the airline industry which has been studied at length. Thus, we do not portray our study as an analysis of all relationships tested in competitive aggressiveness and as such, we realize as a set, the variables examined seem basic. We are bound by the data available, but have teased out the proven relationships thus far in competitive aggressiveness research and we believe these results are generalizable based on the multitude of industries studied. In addition, some of our tests of aggressiveness antecedents are based on a relatively smaller number of correlations due to the limited availability of prior research. While our results support many of the hypothesized relationships put forth in the competitive aggressiveness literature and others fail to achieve significance, these are only as valid as the original data upon which the meta-analysis is based.

With previous findings firmly established, we believe the field will be greatly enhanced by exploring and reaching field-wide conclusions as to other competitive dynamics sub-constructs. For example, competitive dynamics includes other elements, such as response, timing, order, speed, and multi-market contact, and consensus of the antecedents and consequences of these elements would be of interest to researchers and practitioners alike. Also, exploring many of the micro variables that lead to decision-making proclivities and biases that are associated with competitive volume, complexity, and heterogeneity would be a fruitful line of inquiry. The TMT literature reviewed here simply looks at the breadth of traits and experiences without pointing to specific ones that are more or less responsible for drivers of competitive actions. Exploring individual components of heterogeneity may demonstrate that not all heterogeneity is created equal. For example, Andrevski et al. (2014) look specifically at racial diversity. Other areas of diversity, such as age or gender diversity, could have significant impact on aggressiveness. A meta-analysis that covers gender differences concluded that women are generally more perceptive but also more risk-averse (Brewer, Mitchell, & Weber, 2002), and Patel (2013) found men were more likely to react to situations with action. Thus, gender could affect the awareness and motivation of an upper management team or a governing board comprised of more women to undertake different levels of competitive volume, complexity, and heterogeneity compared to a male-dominated board. Along this line, investigation of individual or team level variables such as compensation and corporate governance, and characteristics, such as national origin or political affiliation, would allow competitive dynamics scholars to determine psychological and behavioral issues driving action. Thus, competitive actions can be seen as products of the perceptions and motivations of individual actors and groups of actors within an organization (Chen and Miller, 1994, Chen and Miller, 2012, Dutton and Jackson, 1987). After all, corporations are run by individuals and their mindsets may have a significant impact on how firm resources, shown in our study to drive competitive action, are utilized.

Additionally, the credibility intervals for some of the examined relationships were relatively large suggesting the potential presence of various moderators that could strengthen or weaken these relationships. As Chen and Miller (2015) point out, there may be circumstances where awareness, motivation, and capability are all augmented in times of industry turbulence, which could increase the strength of the relationships between these variables and competitive aggressiveness. Further our meta-analysis focuses on competitive aggressiveness at the action repertoire level. As noted above, there are other levels of analysis specifically sequences and dyads that take time into direct account. For example, Chen and colleagues conduct several studies at the action-response dyads level. Studies at the repertoire level, with the exception of Derfus et al. (2008), do not take response into account. The main effects mentioned above may have a demonstrable effect on the speed of rivals' response times which

in turn could significantly impact performance such as demonstrated by Derfus et al.'s (2008) Red Queen effect. In addition, the timing of action sequences could have significant performance implications both good and bad - is speed necessarily a good thing? (Perlow, Okhuysen, & Reppenning, 2002). This notion of timing and speed and its definitions and impact on the outcomes in competitive interaction could be a fruitful topic of future discussion.

Several studies examined curvilinear relationships but we were unable to meta-analyze them since there was not sufficient number of available correlations (at least three). For example, Andrevski and Ferrier (forthcoming) found an inverted U-shaped relationship between competitive aggressiveness (here measured as volume) and performance. They further found that technological resource depth and network density moderate this U-shaped relationship. Ferrier and Lee (2002) found a curvilinear relationship between the focal firm's strategic heterogeneity and its stock returns. Thus, it is possible that U-shaped relationships exist not only for the variables where no main effects were found, but they could provide more in depth analysis for those where linear effects exist. This suggests that perhaps a delicate balance of volume, complexity, and heterogeneity that has only marginally been probed by competitive dynamics scholars (Deephouse, 1999) will have the greatest impact on performance. In essence, being aggressive is not enough. To achieve competitive advantage, firms will need to ascertain the optimal level of number of competitive moves, balance of competitive moves, and novelty of competitive moves that will maximize performance.

Thus, in answering "where are we now?", we are at a crossroad in the competitive dynamics stream of literature where future research needs to refine measures and examine the various conditions under which these factors influence competitive aggressiveness, and ultimately performance. Scholars need to examine more nuanced set of relationships that will require significant incorporation of moderators and non-linear relationships if we are to move the field of competitive dynamics toward some degree of consensus regarding the antecedents and outcomes of competitive aggressiveness. This will help elucidate why some organizations act differently than others and why some organizations outperform others, providing fruitful guidance to both organizations and the managers who oversee them.

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